Spinal Epidural Abscess Associated with Epidural Anesthesia: Gadolinium-Enhanced Magnetic Resonance Imaging and Its Usefulness in Diagnosis and Treatment

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A case of spinal epidural abscess following epidural anesthesia is described. Gadolinium-enhanced magnetic resonance images were essential in diagnosis of the abscess without frank pus formation, in defining the extension of the infection, and in assessing the therapeutic effect. The patient was successfully treated non-operatively before neurological symptoms developed and full recovery was achieved.

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Introduction

Spinal epidural abscess (SEA) is a rare condition and comprises between 0.2 and 1.6 cases per 10,000 hospital admissions (1–3). Most of the cases of SEA are the consequence of trauma, spinal procedure, extension of adjacent infection, or hematogenous seeding of a distant focus (1, 2, 4–7). However, despite the widespread practice of epidural anesthesia and, in addition, frequently contaminated epidural catheters (8), SEA following epidural anesthesia is extremely rare (9–11). Questionnaire studies directed to obstetricians revealed only one SEA among 505,000 epidural anesthesia in the United Kingdom between 1982 and 1986 (12) and none among 288,351 in France between 1988 and 1993 (13). In spite of its rarity, SEA is a neurosurgical emergency, often taking a disastrous sequel with rapid and irreversible neurological deterioration due to the impairment of the circulation of the spinal cord (1, 2, 5, 7). As its prognosis is related to the duration of the infectious process, early diagnosis is crucial (2, 5).

We present a case of SEA without a frank pus formation following epidural anesthesia. Gadolinium (Gd)-enhanced magnetic resonance (MR) images were diagnostic. The diagnosis was prompt enough to successfully treat non-operatively before the development of neurological symptoms and to allow a complete recovery.

Case Report

An otherwise healthy 35-year-old male had high ligation of left testicular veins for varicocele under epidural anesthesia. Following identification of the epidural space using a loss of resistance technique with sterile normal saline, an epidural catheter was inserted 5 cm beyond the top of Tuohy needle at L3-4 and 10 ml of 2% mepivacain hydrochloride was injected. All the procedures were under aseptic technique and prophylactic intravenous piperacillin had been started. After the operation, continuous injection of 40 ml of 1% mepivacain hydrochloride with two additional shots of morphine hydrochloride solution (5 mg and 2 mg, respectively, in 10 ml of normal saline) were given through the epidural catheter. The catheter was removed 72 hours after its insertion.

He complained of backache near the catheter insertion site soon after the operation and his body temperature elevated to 38.4°C on the first post-operative day. The site of catheter insertion appeared to be devoid of infection, however, a tenderness was noted there. Piperacillin was continued for three days, then his body temperature returned to normal and he had incomplete convalescence of the backache and piperacillin was replaced with oral tosufloxacin. He was discharged on the 5th post-operative day.

After discharge, however, low grade fever developed again in spite of continuous administration of tosufloxacin; on the 8th post-operative day, his body temperature elevated to over 38°C and his backache worsened. He was admitted again. Physical

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and neurological examinations were unremarkable except for a tenderness at the site of catheter insertion.

The white blood cell count was 12,600/ μ l with 65% neutrophils. C-reactive protein was 16.4 mg/dl. An abdominal computed tomography (CT) failed to detect any abnormalities. Lumbar puncture at L2-3 interspace revealed a cerebrospinal fluid (CSF) pressure of 190 mmH₂O, glucose 56 mg/dl, total protein 115 mg/dl, and microscopy revealed mild pleocytosis with a cell count of 52/ μ l (neutrophils 42/ μ l). These findings were considered to be typical of parameningeal infection. Neither blood nor CSF yielded any bacteria. T1-weighted MR images (Fig. 1A Left) showed mild narrowing of the spinal canal at L4-5 level caused by swelling of the posterior soft

tissue. The signal intensity of the posterior margin of the fat was decreased, causing the area isointense to the muscles to widen. After Gd-enhancement (Fig. 1A Right), the posterior epidural space was homogeneously enhanced between L3 and S1, thickest at L4-5 level. These findings were interpreted as an epidural abscess in phlegmonous stage.

Intravenous cefpirome 6 g/day and ampicillin 8 g/day were started and his fever subsided in three days. On the follow-up MR images taken 12 days later (Fig. 1B), the narrowing of the spinal canal was alleviated, however, homogeneous Gd-enhancement of the posterior epidural space persisted. The antibiotics were given for 27 days. Repeated MR images taken 10 days after discontinuation of the antibiotics (Fig. 1C) no longer revealed Gd-enhancement of the epidural space. The recovery was complete.

Discussion

SEA is a very rare condition and those complicating epidural anesthesia are even rarer (1, 2, 12, 14), however, it is a neurosurgical emergency and prompt diagnosis is crucial to reduce the mortality and not to leave neurological impairment (2, 5). Myelography has been the procedure of choice in diagnosis of SEA (1, 2, 4, 5). Nowadays it appears that MR imaging is superior to myelography (6, 7, 14–17) because of the following reasons. The former can demarcate anatomical localization of SEA which, in average, extends four to five vertebral segments (1), discriminate active viable inflammation with Gd-enhancement (16, 18), and avoid the potential risk of disseminating the infection by penetrating the abscess by needle during the latter (1, 7, 14). Gd-enhanced MR imaging is considered to be especially useful in diagnosis of SEA in phlegmonous stage which pathologically corresponds to granulated thickened tissues with embedded microabscess without a collection of liquid pus (15). In the present case, it is likely that prophylactic administration of antibiotic might prevent apparent pus formation and SEA developed only to phlegmonous stage when diagnosis was made. We, therefore, suggest that patients who have fever and back pain after epidural anesthesia should be examined by Gd-enhanced MR images. Our case also confirmed that serial Gd-enhanced MR images were useful in evaluating the therapeutic effects (3) and we could safely discontinue the antibiotics.

While the treatment of choice for SEA is decompression laminectomy and drainage of the abscess with appropriate use of antibiotics (1, 2, 5, 6, 19), sporadic cases successfully treated without surgery have been documented, most of them being diagnosed early enough (2, 6, 20–22). The present case is another example that could be successfully treated conservatively. We were unable to detect a collection of liquid pus in this case and it is doubtful whether laminectomy with drainage was indicated. This case may exemplify the contention that SEA can be managed conservatively if diagnosed before a frank pus formation and neurological deterioration occur.

The CSF finding of the present case was that of typical parameningeal infection, however, complicating meningitis is

Figure 1. (A) Sagittal MR images at diagnosis of spinal epidural abscess. (Left) T1-weighted image (repetition time: 500; echo time: 25) without Gd-enhancement shows mild narrowing of spinal canal at L4-5 level (arrow) caused by swelling of the posterior soft tissue. (Right) Gd-enhanced MR image depicts homogeneous enhancement (arrows) of the posterior epidural space between L3 and S1, thickest at L4-5 level. (B) Gd-enhanced MR image taken 12 days later shows alleviation of the narrowing of the spinal canal, however, homogeneous enhancement of the posterior epidural space still persists (arrows). (C) Follow-up MR image after discontinuation of the antibiotics no longer shows Gd-enhancement of the posterior epidural space.

often experienced (1, 7). Therefore, while Gd-enhanced MR images should precede lumbar puncture for suspected cases of SEA and lumbar puncture is not indispensable in most of the instances, CSF penetration should be taken into consideration when selecting antibiotics as well as causative organisms (1, 2, 4–8, 23).

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